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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ROBERT J. BENKOWSKI
and GINO F. MORELLO

Appeal 2010-007529
Application 10/501,112
Technology Center 3700

Before JEFFREY B. ROBERTSON, DANIEL S. SONG, and
JOSIAH C. COCKS, *Administrative Patent Judges*.

COCKS, *Administrative Patent Judge*.

DECISION ON APPEAL

A. STATEMENT OF CASE

The Appellants appeal under 35 U.S.C. § 134 from a rejection of claims 1, 2, 4, 5, 7-9, 11-15, 19, 20, 24-26, and 28.¹ We have jurisdiction under 35 U.S.C. § 6(b).

¹ The Examiner also originally rejected claims 3, 6, 10, and 27 in the Final Rejection under 35 U.S.C. § 102(e) as anticipated by Medvedev, however,

We affirm-in-part.

References Relied on by the Examiner

Medvedev et al. (“Medvedev”) 2004/0152944 Aug. 5, 2004

The Rejections on Appeal

The Examiner rejected claims 1, 2, 4, 5, 7-9, 11-15, 19, 24-26, and 28 under 35 U.S.C. § 102(e) as anticipated by Medvedev.

The Examiner rejected claim 20 under 35 U.S.C. § 103(a) as unpatentable over Medvedev.

The Invention

The claims are directed to implanted or implantable blood pump systems, and more specifically, to a method and system for physiologic control of such pumps. (Spec. 1, II. 7-8.)

Claims 1 and 7, reproduced below, are illustrative of the claimed subject matter (App. Br., Claims Appendix 25-26):²

1. A method of controlling a blood pump implanted in a patient, comprising:

operating the pump at a predetermined speed;

monitoring the patient’s pump flow rate;

extracting the patient’s diastolic pump flow rate from the

the Examiner withdrew the rejection of those claims in the Answer. (Examiner’s Answer, dated March 31, 2010, hereinafter “Ans.” 2.)

² Appeal Brief filed January 6, 2010, hereinafter “App. Br.” and Claims App’x, respectively.

pump flow rate, wherein the diastolic pump flow rate is a separately isolated flow contribution below a mean pump flow rate; and

changing the predetermined speed in response to the diastolic pump flow rate.

7. A pump system, comprising:

a pump; and

a controller having an input for receiving a blood pump flow rate signal, the controller being programmed to extract a separate diastolic pump flow rate from the blood pump flow rate signal and provide a control signal to the pump to vary the speed of the pump in response to the separate diastolic pump flow rate, wherein the separate diastolic pump flow rate is a flow contribution below a mean flow rate.

B. ISSUES

1. Did the Examiner correctly find that Medvedev discloses “extracting the patient’s diastolic pump flow rate from the pump flow rate, wherein the diastolic pump flow rate is a separately isolated flow contribution below a mean pump flow rate,” as recited in claims 1 and 26?

2. Did the Examiner correctly find that Medvedev discloses the step of “wherein changing the predetermined speed includes increasing the pump speed in response to an increase in the heart rate,” as recited in claim 4?

3. Did the Examiner correctly find that Medvedev discloses “a controller having an input for receiving a blood pump flow rate signal,” as recited in claim 7?

C. ANALYSIS

The Examiner rejected claims 1, 2, 4, 5, 7-9, 11-15, 19, 24-26, and 28 as anticipated by Medvedev and claim 20 as unpatentable over Medvedev.

Claims 1 and 26

Claims 1 and 26 are independent claims and are each directed to a method of controlling a blood pump implanted in a patient. Each claim includes the following limitation: “extracting the patient’s diastolic pump flow rate from the pump flow rate, wherein the diastolic pump flow rate is a separately isolated flow contribution below a mean pump flow rate.....” (App. Br. 25, 28, Claims App’x.) The Examiner found that Medvedev discloses a value associated with ventricular diastole, $Q_{\text{peak}(-)}$, which is extracted and/or derived from a mean flow rate, and which represents the average of the peak minimum instantaneous flow rates. (Ans. 4.) The Examiner thus found that Medvedev accounts for the above-noted limitations of claims 1 and 26.

The Appellants challenge the Examiner’s findings, arguing that, in contrast to Medvedev, the presently claimed invention is directed to controlling the pump based on a diastolic pump flow rate that has been “extract[ed]” from an actual explicitly monitored pump flow rate such as by use of the system shown in Figure 5. (App. Br. 7-8.) Evidently, according to the Appellants, Medvedev does not disclose any “extracting” act. (*Id.*) The Appellants further argue that even if Medvedev does teach “extracting,” Medvedev does not teach “‘extracting [the] . . . diastolic pump flow rate from the pump flow rate’” because Medvedev does not teach extracting a diastolic flow rate from another flow rate. (*Id.* at 8-9.)

We are not persuaded by the Appellants' arguments. We do not agree that one of ordinary skill in the art would have understood "extracting" a diastolic flow rate to require any more than what is disclosed in Medvedev. During examination of a patent application, pending claims are given their broadest reasonable construction consistent with the specification. *See In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004). In construing claims, our reviewing court has instructed that:

[W]e search for the ordinary and customary meaning of a claim term to a person of ordinary skill in the art. We determine this meaning by looking first at intrinsic evidence such as surrounding claim language, the specification, the prosecution history, and also at extrinsic evidence, which may include expert testimony and dictionaries.

L.B. Plastics, Inc. v. Amerimax Home Products Inc., 499 F.3d 1303, 1308 (Fed. Cir. 2007) (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1314-19 (Fed. Cir. 2005) (en banc)).

The Examiner determined that the Appellants' Specification does not set forth any special meaning of the term "extracting" and relied on definitions of "extract" as "to draw forth (as by research) <extract data>" and "to determine (a mathematical root) by calculation" (citing <http://www.merriam-webster.com/dictionary/extract>) and "pull something out" or "obtain something from a source" (citing Encarta World English Dictionary). (Ans. 6.) The Appellants have not proffered any contrary definitions nor pointed to any language in the Specification conveying that the term "extract" takes on a different meaning. *See In re Zletz*, 893 F.2d 319, 321 (Fed. Cir. 1989) (noting that the words of the claim must be given their plain meaning unless the plain meaning is inconsistent with the

Specification). Therefore, we agree with the Examiner that one of ordinary skill in the art would have understood “extract” as defined above. Having construed the claims, we now turn to the prior art. *See Medichem, S.A. v. Rolabo, S.L.*, 353 F.3d 928, 933 (Fed. Cir. 2003) (noting that the first step in an anticipation analysis is a proper construction of the claims, and the second step in the analyses requires a comparison of the properly construed claim to the prior art).

As the Examiner noted (Ans. 6), Medvedev’s $Q_{\text{peak}(-)}$ is the average of the peak minimum instantaneous flow rates within each cardiac cycle, where the peak minimum flow is associated with ventricular diastole. (Medvedev ¶ [0059].) $Q_{\text{peak}(-)}$ is obtained or calculated (*i.e.*, “extracted”) from an average of peak minimum flow rates that are below a mean pump flow rate Q_{mean} . (*Id.* at ¶¶ [0057], [0059].) Therefore, $Q_{\text{peak}(-)}$ is representative of a diastolic flow rate. Medvedev necessarily “extracts” or obtains this diastolic flow rate, $Q_{\text{peak}(-)}$, because $Q_{\text{peak}(-)}$ is a separately calculated value which is isolated for inclusion in the determination of a separate variable termed the flow pulsatility “DQ.” (*Id.* at ¶¶ [0056]-[0059].) Thus, we agree with the Examiner that Medvedev discloses “extracting” a diastolic pump flow rate “from the pump flow rate, wherein the diastolic pump flow rate is a separately isolated flow contribution below a mean pump flow rate.”

The Appellants also contend that Medvedev is only concerned with the average of the minimum peaks over multiple cardiac cycles, which Medvedev associates with ventricular diastole, rather than what the Appellants term “an actual extracted or separately isolated diastolic flow rate.” (App. Br. 9-10.) (emphasis omitted). In this regard, the Appellants argue that Medvedev’s average of peaks cannot actually represent any true

diastolic pump flow rate, but rather that Medvedev's average of peaks is merely an average of extremes and is necessarily skewed low. (Reply Brief, dated April 5, 2010, hereinafter "Reply Br." 3.)

We are not in agreement with the Appellants. As discussed above, Medvedev discloses the act of obtaining $Q_{\text{peak}(-)}$, which constitutes the average of peak minimum flow rates that are associated with ventricular diastole. Claims 1 and 26 require simply that a patient's "diastolic pump flow rate" is extracted. The claims do not specify any measure for how closely the diastolic pump flow rate corresponds to some "true" or "actual" rate, nor do the claims exclude from their scope an average pump flow rate extracted from a mean pump flow rate, as discussed *supra*, and associated with ventricular diastole, as is set forth in Medvedev.

Anticipation is established when a single prior art reference discloses all elements of the claimed invention. *In re Spada*, 911 F.2d 705, 708 (Fed. Cir. 1990). Here, we are not persuaded that the Examiner did not properly account for all the features of claims 1 and 26 in Medvedev. For the foregoing reasons, we sustain the rejection of claims 1 and 26 as anticipated by Medvedev.

Claims 2, 5, 14, 15, 24, and 25, are dependent, either directly or indirectly, on claim 1. Claim 28 is dependent on claim 26. The Appellants do not argue the patentability of claims 2, 5, 14, 15, 24, 25, and 28, apart from the independent claims. We, therefore, also sustain the rejection of those dependent claims as anticipated by Medvedev.

Claim 4

Claim 4 is dependent on claim 2, which is, in turn, dependent on claim 1. Claim 1 includes the limitation of operating a pump at a predetermined

speed. Claim 2 adds the features of monitoring the patient's heart rate and "changing the predetermined speed in response to the heart rate." (App. Br. 25, Claims App'x.) Claim 4 further specifies that "changing the predetermined speed includes increasing the pump speed in response to an increase in the heart rate." (*Id.*) The Examiner found that Figure 1 of Medvedev, and the accompanying description in the Specification, teaches that the pump flow rate, and therefore speed of the pump, is increased in response to an increase in heart rate. (Ans. 7.)

The Appellants argue that the Examiner does not address claim 4's recitation of "wherein changing the predetermined speed includes increasing the pump speed in response to an increase in the heart rate" and that Medvedev does not teach this limitation. (App. Br. 12.)

We are not persuaded by the Appellants' argument that Medvedev does not disclose an increase in pump speed as a result of an increase in heart rate. The Examiner determined (Ans. 7) that Figure 1 of Medvedev depicts a relationship between heart rate and flow rate, whereby flow rate (and therefore speed) of the pump is increased as a result of an increase in heart rate. (Medvedev Fig. 1; ¶¶ [0026]-[0032].) The Appellants do not address that determination or explain why it is incorrect. Accordingly, we are not persuaded of any mistake in the Examiner's rejection of claim 4 as anticipated by Medvedev. We sustain the rejection.

Claim 7

Claim 7 is an independent claim and is drawn to a pump system. Claim 7 includes recitation of "a controller having an input for receiving a blood pump flow rate signal. . . ." (App. Br. 26, Claims App'x.) The Examiner found that element 18 in Medvedev's Figure 6 discloses a

controller that receives inputs of the flow rate sensor comprised of the current, power, and frequency components, which allegedly accounts for the above-quoted feature of claim 7. (Ans. 7.)

The Appellants argue that while Medvedev's controller receives inputs, it does not have an "input for receiving a blood pump flow rate signal," but rather that Medvedev's controller calculates the flow rate internally based on speed and current signals. (App. Br. 13.) The Appellants argue that meaning must be given to "blood pump flow rate signal" beyond just "signal," as offered by the Examiner, because the descriptor "blood pump flow rate" must mean something and must somehow modify "signal." (Reply Br. 4.)

We agree with the Appellants that while Medvedev's controller does have inputs and those inputs receive signals, Medvedev's inputs are used to receive speed and current signals, not a flow rate signal. While the Examiner has shown that Medvedev's controller ultimately determines blood flow rate, the Examiner has not shown that Medvedev's controller receives a blood pump flow rate signal. Rather, Medvedev's controller calculates the flow rate internally, only after receiving current, frequency, and voltage signals from sensors within Medvedev's device. (Medvedev ¶¶ [0037]-[0038]; [0047]-[0048].) Because the blood pump flow rate is calculated internally in Medvedev, there is no need for a blood pump flow rate signal to be received by the controller, and indeed, there is no teaching of the same in Medvedev. The Examiner has not shown that all of the elements of claim 7 are disclosed in Medvedev. Accordingly, we do not sustain the rejection of claim 7 as anticipated by Medvedev.

Claims 8, 9, 11-13, and 19 are ultimately dependent on, and thus include all the limitations of, claim 7. We also do not sustain the rejection of those dependent claims as anticipated by Medvedev.

Claim 20 is dependent on claim 19 and was rejected as unpatentable in view of Medvedev. The Examiner's obviousness rationale for rejecting claim 20 is advanced only to account for features added by claim 20 and does not make up for the deficiencies of Medvedev noted above in conjunction with claim 7. Accordingly, we do not sustain the Examiner's rejection of claim 20 as unpatentable over Medvedev.

D. CONCLUSION

1. The Examiner correctly found that Medvedev discloses "extracting the patient's diastolic pump flow rate from the pump flow rate, wherein the diastolic pump flow rate is a separately isolated flow contribution below a mean pump flow rate," as recited in claims 1 and 26.

2. The Examiner correctly found that Medvedev discloses the step of "wherein changing the predetermined speed includes increasing the pump speed in response to an increase in the heart rate," as recited in claim 4.

3. The Examiner did not correctly find that Medvedev discloses "a controller having an input for receiving a blood pump flow rate signal," as recited in claim 7.

E. ORDER

The rejection of claims 1, 2, 4-5, 14-15, 24-26, and 28 under 35 U.S.C. § 102(e) as anticipated by Medvedev is **affirmed**.

The rejection of claims 7-9, 11-13, and 19 under 35 U.S.C. § 102(e) as anticipated by Medvedev is **reversed**.

The rejection of claim 20 under 35 U.S.C. § 103(a) as unpatentable over Medvedev is reversed.

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1).

AFFIRMED-IN-PART

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